

Candidate Name	Centre Number	Candidate Number

WELSH JOINT EDUCATION COMMITTEE
General Certificate of Education
Advanced Subsidiary/Advanced



CYD-BWYLLGOR ADDYSG CYMRU
Tystysgrif Addysg Gyffredinol
Uwch Gyfrannol/Uwch

312/01

BIOLOGY

MODULE B12

A.M. TUESDAY, 8 June 2004

(1 hour 30 minutes)

For Examiner's Use Only

Total Marks	
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INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The quality of written communication will affect the awarding of marks.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

1. Complete the following sentences giving the correct name:

(a) The change from bare rock to woodland is called [1]

.....

(b) The apparatus used to measure lung volume is called a [1]

.....

(c) The disease caused by the breaking down of the walls of the alveoli is called [1]

.....

(d) An organism that manufactures its own food from inorganic chemicals is called an [1]

.....

(e) The structure that initiates waves of excitation across the atria is called the [1]

.....

(Total 5 marks)

2. Whitefly is a typical greenhouse pest that affects many crops. Treatment against this pest can be chemical control by the use of pyrethroids, or biological control by use of the parasitic wasp *Encarsia formosa*.

(a) State what is meant by the term *parasite*. [2]

.....

.....

(b) State **one** advantage of the use of chemical control of pests such as whitefly. [1]

.....

.....

(c) The following information is provided by a manufacturer who supplies *Encarsia formosa* to growers to control whitefly:

- At a temperature below 18°C the parasitic wasps are almost unable to fly and their searching ability is seriously limited.
- Certain pesticides (e.g. pyrethroids) can have a long residual effect on *Encarsia*.
- As whitefly populations develop, the leaves of the crop become coated with their sticky excreta (honeydew) and this hampers the mobility of *Encarsia*.

Using the manufacturer's information and your own knowledge:

- (i) Give **two** reasons why it would not be appropriate to use both chemical (pyrethroids) and biological (*Encarsia formosa*) methods to control whitefly, at the same time. [2]

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.....

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- (ii) Suggest why the use of *Encarsia formosa* would not be effective if whitefly attacked crops in fields in the UK. [2]

.....

.....

- (iii) Explain why the late application reduces the effectiveness of *Encarsia formosa*. [1]

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.....

(d) Certain ornamental plants must be grown in a completely pest free environment.

Suggest why *Encarsia formosa* could not be used to achieve this situation. [1]

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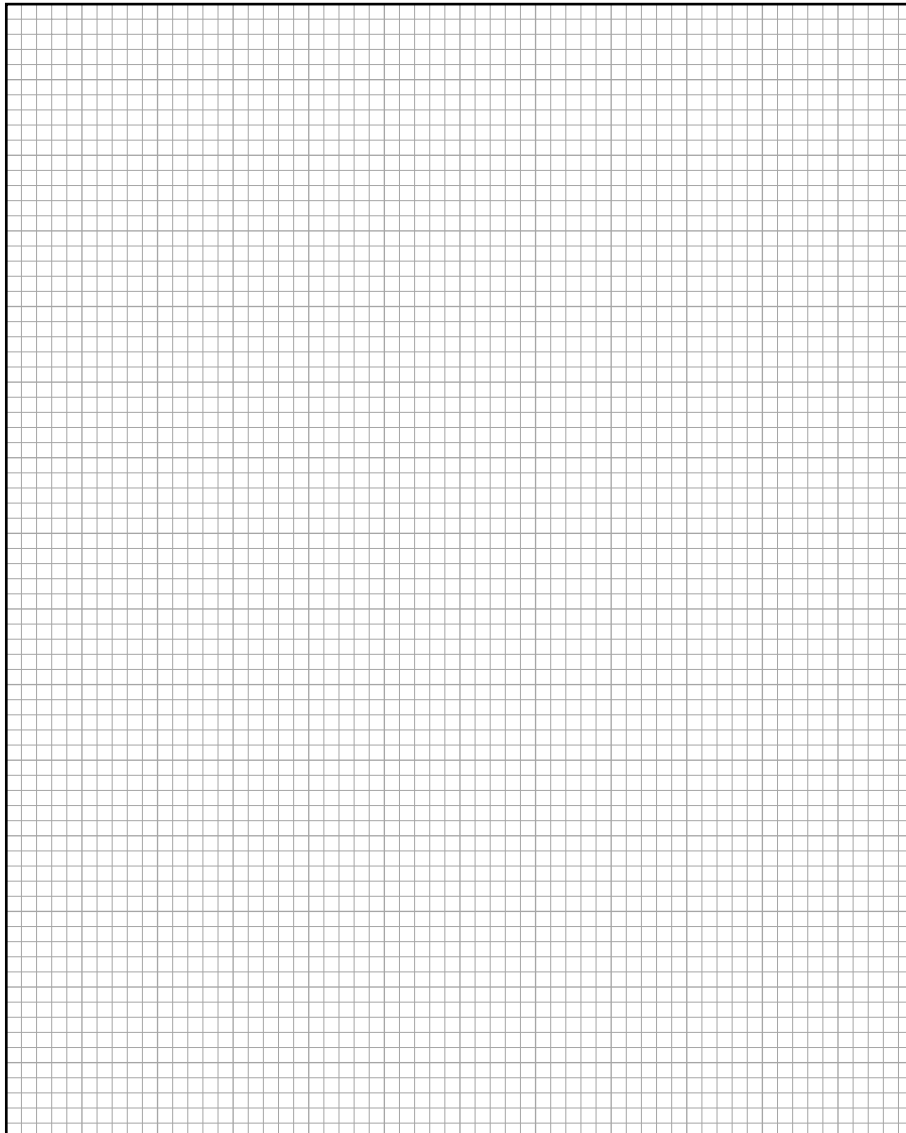
(Total 9 Marks)

3. A student monitored the growth of a population of yeast cells in a culture flask. At two hour intervals the number of cells that were growing in the culture flask was determined and the data recorded as shown in the table.

<i>Age of culture/h</i>	<i>No. of cells $\times 10^5$</i>
0	1
2	4
4	30
6	68
8	240
10	450
12	610
14	680
16	690
18	688
20	690

- (a) Plot a graph to show cell numbers vs culture age.

[4]



(b) How many yeast cells were present at 7 hours? [1]

.....

(c) What was the carrying capacity of this culture? [1]

.....

(d) Explain why the population levelled off at a steady state. [2]

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(e) With reference to the graph, identify each of the phases that occur between: [2]

0 - 6 hours;

8 - 14 hours.

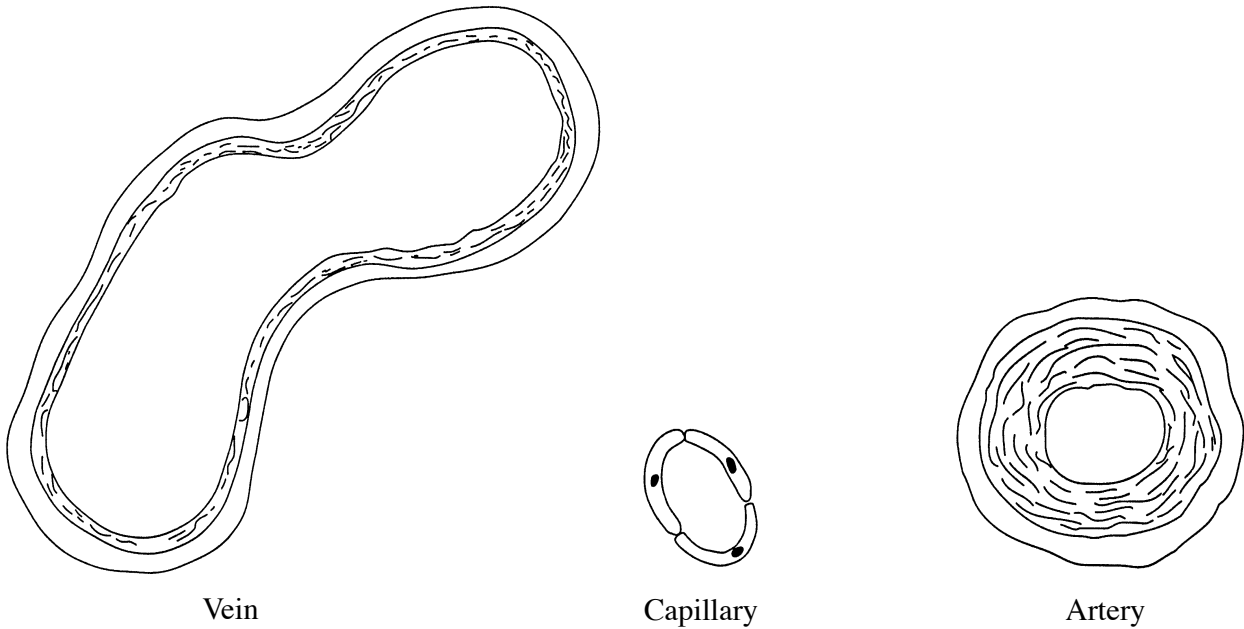
(f) The culture was left for another 20 hours. Describe what you would expect to happen to the yeast population over this time. [1]

.....

.....

(Total 11 Marks)

4. The diagrams below show transverse sections of three different types of blood vessel. They are not drawn to the same scale.



- (a) Complete the table giving **one** structural feature of each blood vessel and explain how this feature enables the vessel to carry out its function.

<i>Vessel</i>	<i>Structural Feature</i>	<i>Function Related to Feature</i>
Vein		
Capillary		
Artery		

[6]

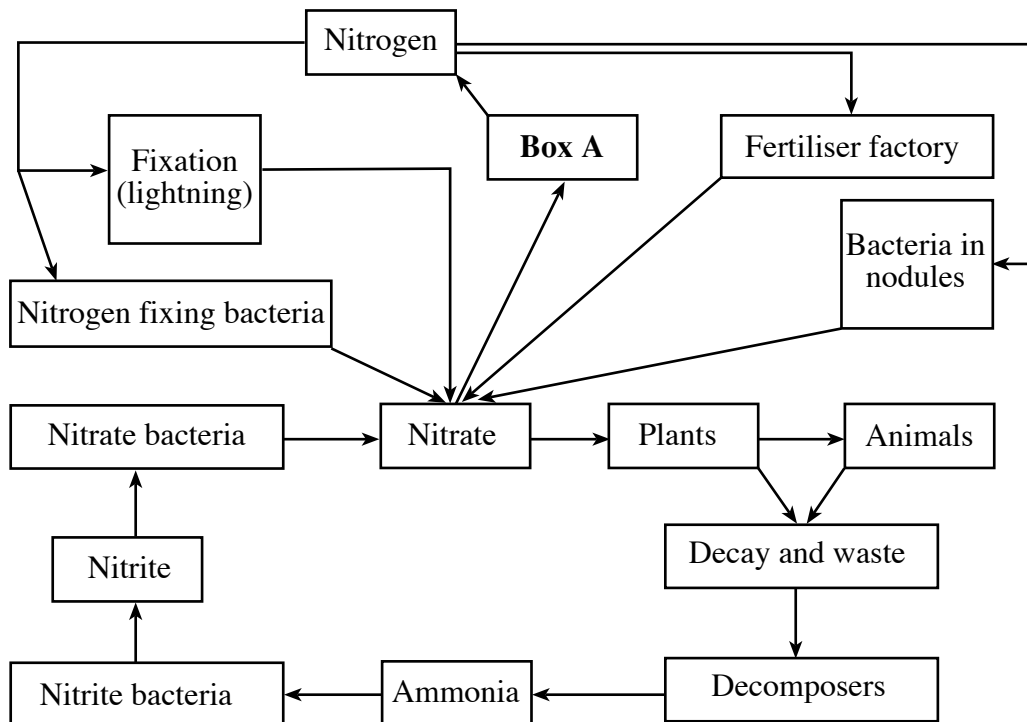
- (b) State **one other** structure, not shown in the diagram, that is found in a vein.

[1]

.....

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5. (a) The diagram below shows the Nitrogen Cycle.



- (i) State the name of the process indicated by **Box A**.

[1]

.....

- (ii) State **one type** of organism represented by the 'Decomposers' box.

[1]

.....

- (b) Describe the use made by plants of nitrate.

[3]

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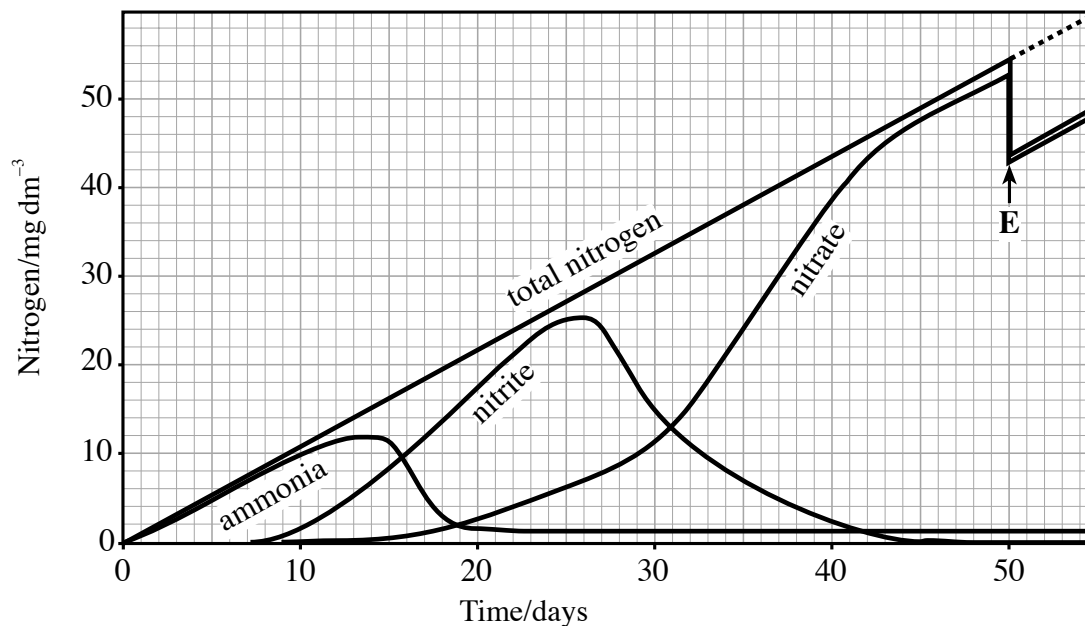
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- (c) The diagram below shows the levels of ammonia, nitrite and nitrate in the water of a closed fish tank, containing two goldfish, from the time it was set up (day 0) until day 50.



- (i) Describe the changes in nitrite and nitrate concentrations in the water in the tank between days 0 and 40. [3]

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- (ii) Suggest why the level of ammonia increases between day 0 and day 12. [1]

.....

.....

- (iii) Explain why the level of ammonia in the water decreases after day 15. [2]

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.....

- (iv) Explain why the level of nitrate differs from that of nitrite by day 40. [1]

.....

.....

- (v) Suggest what could have happened to cause the effect at point E on the diagram. [1]

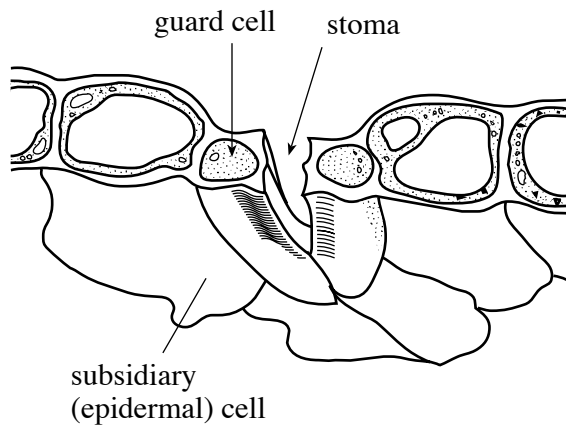
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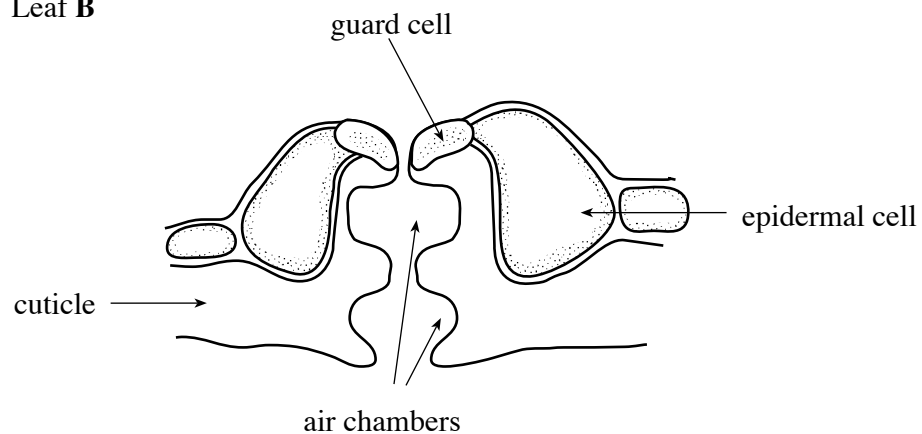
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6. Each diagram below shows a section through the epidermis of a leaf. Leaf A is from a plant that grows in areas of regular rainfall. Leaf B is from a plant that grows in very dry conditions.

Leaf A



Leaf B



- (a) (i) Describe **two** features of Leaf B that enables the plant to live in very dry conditions. [2]

.....

.....

.....

- (ii) Explain how each of these features are effective. [2]

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- (iii) Describe and explain **one other** feature, not shown in Leaf **B**, that may be present in such plants to reduce the amount of water vapour lost by transpiration. [2]

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.....

.....

- (b) (i) State the general name given to plants that are adapted to living in dry conditions. [1]

.....

- (ii) Describe **two** environmental factors that can **decrease** the rate of transpiration in a plant. [2]

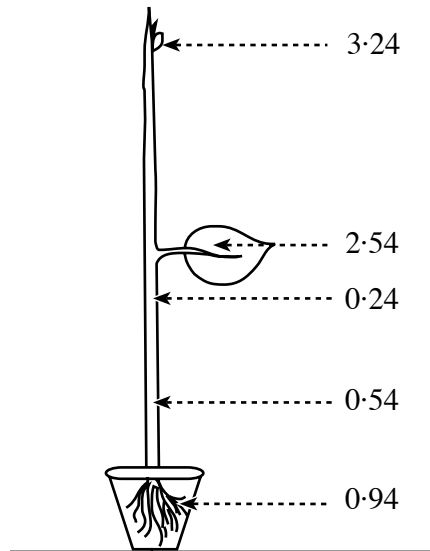
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(Total 9 Marks)

7. An experiment was performed in which $^{14}\text{CO}_2$ was applied to a single leaf of a plant kept in the light. The distribution of the ^{14}C throughout the plant was subsequently monitored. The diagram shows the distribution of ^{14}C throughout the plant (in arbitrary units).



- (a) State the name of the substance in which the ^{14}C will be transported in the stem. [1]

.....

- (b) Explain how the results demonstrate that bi-directional flow occurs in the stem. [2]

.....

- (c) (i) Explain the relatively high value of ^{14}C found at the top of the stem. [2]

.....

- (ii) State the general name given to areas where unloading of carbohydrate occurs. [1]

.....

(Total 6 Marks)

Any diagrams included in your answer must be fully annotated.

[10]

[10]

[illegible]

This image shows a full page of a handwriting practice worksheet. It consists of approximately 20 horizontal rows. Each row is defined by two parallel dashed lines, creating a series of uniform gaps for letter height. The lines are evenly spaced across the entire page, providing a guide for consistent letter formation. There is no text or other markings on the page.

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